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EXAMINER	
PASIA, REDENTOR M	

ART UNIT	PAPER NUMBER
2416	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/671,203	WISE ET AL.	
	Examiner	Art Unit	
	REDENTOR M. PASIA	2416	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05/04/2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5, 7-12, 15-20 and 22-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5, 7-12, 15-20 and 22-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *05/22/2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed on 05/04/2009 has been entered. Claims 1, 9, 16-20 and 22-23 have been amended. Claim 14 is cancelled and claims 6, 13 and 21 were previously cancelled. No claims have been added. Claims 1-5, 7-12, 15-20 and 22-23 are still pending in this application, with claim 1, 9 and 16, being independent.

Response to Arguments

- Rejection under 35 USC 112 2nd Paragraph

Applicant's arguments, see Applicant's Remarks (filed 05/04/2009), page 11 have been fully considered but they are not persuasive. Applicant's Attorney states that "claims 1 and 16 have also been amended to correct minor instances where a limitation may have been ambiguous, or where antecedent basis may have been lacking."

Even though claim 1 and 16 was amended, the claim limitation "a link receiver" in line 16 of claim 1 and line 15 of claim 16 was not amended to address the previous antecedence problems as shown in the previous Office Action (posted 02/03/2009). Thus, claim 1 and 16 are still rejected under 35 USC 112 2nd Paragraph, and no new rejections are introduced other than the ones based on the newly-added claim limitation.

- Rejection under Obviousness-type Double Patenting

Applicant's arguments, see Applicant's Remarks (filed 05/04/2009), with respect to claims 1-5, 7-12, 14-20 and 22-23 have been fully considered and are persuasive. The rejection under obviousness-type double patenting of claims 1-5, 7-12, 14-20 and 22-23 has been withdrawn.

- Rejection under 35 USC 103

Applicant's arguments, see Applicant's Remarks (filed 05/04/2009), page 12 have been fully considered but they are not persuasive.

Regarding independent claims 1, 9 and 16, Applicant's Attorney has amended the claims to include at least the claim limitation, "a link receiver flow control algorithm". Applicant's Attorney further presents arguments that the combination of Martin in view of Bloch does not show the claim limitation, "a link receiver flow control algorithm".

However, the Examiner respectfully disagrees with the Applicant's Attorney and asserts that the combination of Martin in view of Bloch shows the above-mentioned claim limitation.

Briefly, Martin shows a control module for managing information flow (i.e. transmission of frames) and managing buffer space (col. 5, lines 13-25, col. 10, lines 19-29). Additionally, certain functions performed by the receiver directly relates to the management of the buffer space and performing functions related to flow control (col. 1, line 60 to col. 2, line 20; col. 8, line 23-24, lines 60-62). In this instance, given the receiver performing the mentioned functions as shown above, the control module can also be seen as performing receiver flow control method. Thus, the control module is seen as a link receiver flow control module/algorithm. Further details are provided in the rejection of the said claim limitations (see rejections).

Claim Objections

2. **Claims 15** is objected to because of the following informalities:

Claim 15 shows dependency on the presently cancelled claim 14. The dependency of claim 15 must be revised in order to show the proper dependency. However, in the examination of the claim, the Examiner has applied claim 15 to be dependent upon claim 9.

Also, claim 15 shows the claim limitation "the switch fabric network" in line 1. The limitation "the switch fabric network" in line 1 must be replaced with "[[the]] a switched fabric network" in order to avoid future objections/antecedence problems.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. **Claims 1-5, 7-12, 15-20, 22-23** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. **Claim 1** recites the limitation "a link receiver" in line 16. It is not clear if "a link receiver" in line 16 is related to "a link receiver in line 2. If they are related, "a link receiver" in line 16 must be revised to "[[a]] the link receiver". If they are not related, "a link receiver" in line 16 must be revised to "[[a]] another link receiver". However, in the rejection of the claims, "a link receiver" in line 10 has been interpreted as being the same as "a link receiver" in line 2. There is insufficient antecedent basis for this limitation in the claim.

6. **Claim 1** also recites the limitation "the transmitter" in line 10. It is not clear if the limitation "the transmitter" in line 10 is related to "a link transmitter" in line 2. If they are related, the limitation "the transmitter" in line 10 must be revised to "the link transmitter". If they are not related, Applicant's Attorney should note in the Response to the Office Action in order to clarify the problems. However, in the rejection of the claims, "the transmitter" in line 10 has been interpreted as being the same as "a link transmitter" in line 2. There is insufficient antecedent basis for this limitation in the claim.

7. **Claim 1** also recites the limitation "the receive buffers" in line 12 and another instance in line 13. It is not clear if the instances of the limitation "the receive buffers" is related to "a plurality of receiver buffers" in line 8 or "a number of free receiver buffers" in lines 9-10. If they are related to "the plurality of receiver buffers", the limitation "the receive buffers" in line 12 must be revised to "the plurality of receiver [[the receive]] buffer". If they are related to "a number of free receiver buffers", the limitation "the receive buffers" in line 12 must be revised to "the number of free receiver [[the receive]] buffer" . However, in the rejection of the claims, "the receive buffers" has been interpreted as being related to "a plurality of receiver buffers. There is insufficient antecedent basis for this limitation in the claim.

8. **Claim 1** also recites the limitation "the data credits", one instance in line 13 and another instance in line 21. It is not clear if the limitation "the data credits" is related to "a plurality of data credits" in line 2. If they are related, the two instance of the limitation "the data credits" must be revised to "the plurality of data credits". However, in the rejection of the claims, "data credits has been interpreted as being the same as "a plurality of data credits" in line 2. There is insufficient antecedent basis for this limitation in the claim.

9. **Dependent claims 2-5, 7-8** are rejected based on the same reasoning as presented above, since the dependent claims share the same claim limitation present in independent claim 1.

10. **Claim 9** recites the limitation "the receiver buffers" in line 12. It is not clear if "the receiver buffers" in line 12 is related to "a plurality of receiver buffers" in line 2. If they are related, "the receiver buffers" in line 12 must be revised to "the plurality of receiver buffers". If they are not related, "the receiver buffers" in line 12 must be revised to "[[the]] receiver buffers". However, in the rejection of the claims, "the receiver buffers" in line 12 has been interpreted as being the same as "a plurality of receiver buffers" in line 2. There is insufficient antecedent basis for this limitation in the claim.

11. **Dependent claims 10-12, and 15** are rejected based on the same reasoning as presented above, since the dependent claims share the same claim limitation present in independent claim 9.

12. **Claim 16** recites the limitation "a link receiver" in line 15. It is not clear if "a link receiver" in line 15 is related to "a link (a) receiver in line 4. If they are related, "a link receiver" in line 15 must be revised to "[[a]] the link receiver". If they are not related, "a link receiver" in line 15 must be revised to "[[a]] another link receiver". However, in the rejection of the claims, "a link receiver" in line 15 has been interpreted as being the same as "a link (a) receiver" in line 4. There is insufficient antecedent basis for this limitation in the claim.

13. **Claim 16** also recites the limitation "the receiver buffers" in line 12. It is not clear if "the receiver buffers" in line 12 is related to "a plurality of receiver buffers" in line 10. If they are related, "the receiver buffers" in line 12 must be revised to "the plurality of receiver buffers". If they are not related, "the receiver buffers" in line 12 must be revised to "[[the]] receiver buffers".

However, in the rejection of the claims, "the receiver buffers" in line 12 has been interpreted as being the same as "a plurality of receiver buffers" in line 10. There is insufficient antecedent basis for this limitation in the claim.

14. **Claim 16** also recites the limitation "the number of the data credits" in line 19. It is not clear if the limitation "the number of the data credits" in line 19 is related to "a plurality of data credits" in line 4. If they are related, the limitation "the number of the data credits" must be revised to "the [[number of the]] plurality of data credits". However, in the rejection of the claims, "the number of the data credits" has been interpreted as being the same as "a plurality of data credits" in line 4. There is insufficient antecedent basis for this limitation in the claim.

15. **Dependent claims 17-20 and 22-23** are rejected based on the same reasoning as presented above, since the dependent claims share the same claim limitation present in independent claim 16.

Claim Rejections - 35 USC § 103

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

17. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

18. **Claims 1-5, 7-12, 15-20, 22-23** are rejected under 35 U.S.C. 103(a) as being unpatentable over Martin et al. (US 7,301,898 B1; hereinafter Martin) in view of Bloch et al. (US 6,922,408; B2; hereinafter Bloch).

As to claim 1, Martin shows a method (abstract shows a method; see figures 7-8), comprising:

providing from a link a receiver (Figure 7-8; receiver 46) a plurality of data credits to a link transmitter (Figures 7-8; note the plurality of credits (shown in figures as circles) sent from the receiver 46 to transmitter 44);

allocating at the link transmitter the plurality of data credits to a plurality of logical channels (Figure 7-8; col. 8, lines 35-48 the transmitter controls the allocation of the credits to each virtual channel (VC); further note the plurality of VCs (VC0-7).);

transmitting a plurality of packets (Figures 7-8, note that frames as shown as squares) from the link transmitter to the link receiver (Figures 7-8; note the transmission of frames (denoted by squares in figures) from transmitter 44 to receiver 46);

a forward link (Figures 7-8; note the VC/link where frames (squares) are transmitted along is the forward link as viewed by transmitter 44) and a reverse link (Figures 7-8; note the VC/link where credits are transmitted along is the reverse link as viewed by transmitter 44), and

wherein the plurality of packets are transmitted on the forward link (Figures 7-8; note the plurality of frames (multiple squares) are transmitted on the VC/link; further note that since the packets are transmitted from the transmitter 44 to receiver 46, the transmitter 44 views the VC/link where the frames are transmitted as a forward VC/link; col. 5, lines 13-25.);

storing the plurality of packets in a plurality of receiver buffers at the link receiver (col. 1, lines 60 to col. 2, lines 10; note that a receiver on a port is allocated a fixed amount of buffer space to store received frames; each time a frame is received by the receiver, the frame is stored in a buffer space; col. 5, lines 13-25; note the buffer spaces in central memory is seen as the plurality of buffers);

updating (Figures 7-8; note that the (buffer) pool is updated when the frames are received by the receiver 46 and/or when credits are transmitted by receiver 46) a free buffer pool at the link receiver (Figures 7-8; col. 1, line 60 to col. 2, line 20; a receiver on a port is allocated a fixed amount of buffer space to temporarily store received frames; the receivers advertise to the transmitters the amount of buffer space represented by the number of credits available; in this instance, it can be seen that amount of buffer space (free buffer pool) is present in the receiver side. Further note the usage of credits in relation to the pool in the process performed in Figures 7-8) with a number of free receiver buffers available to receive new packets from the transmitter (Figure 7-8; col. 5, lines 13-25; note that buffer spaces are allocated among ports in the switch wherein the operation of the buffer-to-buffer credit which represents the buffer space as performed; col. 1, line 60 to col. 2, line 20; a receiver on a port is allocated a fixed amount of buffer space to temporarily store received frames; the receivers advertise to the transmitters the amount of buffer space represented by the number of credits available; thus, in this instance, the

issuance/advertisement of credits to transmitter is seen as an indicator that a number of buffer spaces present in the receiver are available to receive frames.),

the number of free receiver buffers represented by a corresponding number of the data credits (Figures 7-8; col. 1, line 60 to col. 2, line 20; the receivers advertise to the transmitters the amount of buffer space represented by the number of credits available; see also col. 5, lines 13-25)

using a link receiver flow control algorithm (col. 5, lines 13-25, col. 10, lines 19-29; note control module for managing information flow (i.e. transmission of frames) and managing buffer space. It is noted that the present invention (i.e. process shown in Figure 7-8) is loaded into a control module; col. 8, line 23-24, shows the receiver advertises the total credits available for the port; col. 8, lines 60-62, shows the receiver starts to return credits when a frame transmitted from a transmitter reaches the receiver. It is noted that the transmission of credits are one way of regulating the buffer space in the receiver as shown in col. 1, line 60 to col. 2, line 20. In this instance, the two examples shown above are examples of flow control process (i.e. advertisement of credits, regulation of buffer space) performed by the receiver and since the control module is stated to manage buffer space, the control module can also be seen as performing receiver flow control method. Thus, the control module is seen as a link receiver flow control module/algorithm) in communication with the receive buffers (col. 5, lines 13-25, col. 10, lines 19-29; shows that the control module at least manages the buffer space. In order to manage buffer space, the control module is in communication with the buffer space; Also, note the buffer spaces in central memory is seen as the plurality of buffers)

to monitor emptying of the receive buffers (Figure 7-8; col. 5, lines 13-25, col. 10, lines 19-29; note control module manages information flow (i.e. transmission of frames) and manages buffer space; col. 2, lines 11-14; note that once the frame is retransmitted by the transmitter on the receiving side (i.e. receiver), or used by the device, then the buffer space is free to be used or to store a new frame) and

to update to the data credits contained in the free buffer pool (Figures 7-8; note that the (buffer) pool is updated when the frames are received by the receiver 46 and/or when credits are transmitted by receiver 46; col. 1, line 60 to col. 2, line 20; a receiver on a port is allocated a fixed amount of buffer space to temporarily store received frames; the receivers advertise to the transmitters the amount of buffer space represented by the number of credits available; in this instance, it can be seen that amount of buffer space (free buffer pool) is present in the receiver side. Further note the usage of credits in relation to the pool in the process performed in Figures 7-8);

using the link receiver flow control algorithm (col. 5, lines 13-25, col. 10, lines 19-29; note control module managing information flow (i.e. transmission of frames) and managing buffer space. In particular, receiver flow control is performed as shown in Figure 8 in relation to receiver advertising/returning credits) to transmit additional data credits from a link receiver to the link transmitter on the reverse link (Figures 7B, 8B; shows transmission of additional credits by the receiver on the VC/link (reverse VC/link as viewed by transmitter 44) if the free buffer pool contains additional data credits (Figures 7-8; col. 1, line 60 to col. 2, line 20; col. 8, line 14 to col. 9, line 18; note that credits are transmitted since there are available/additional credits) and the reverse link is idle (Figures 7A-7B, 8A-8B; note that prior to situation shown in Figures

7B/8B, the VC/link (reverse link as viewed by transmitter 44) where the credits are transmitted is idle (i.e. no credits are currently being transmitted).); and

wherein the link receiver flow control algorithm (col. 5, lines 13-25, col. 10, lines 19-29; note control module) decreases the free buffer pool at the link receiver by a value corresponding to the data credits (col. 1, lines 60-62; note that the receiver is allocated a fixed amount of buffer space represented by a fixed number of buffer-to-buffer credits. Figure 7-8, col. 5, lines 13-60; also note that upon reception of the frames transmitted by the transmitter, the receiver starts to transmit credits to the transmitter where the credits represent available buffer space. It is noted that the transmission of credits advertises the available buffer space to be used by the transmitter and thus, it can be seen that the issuance/advertisement of credits, decreases the available buffer space (free buffer pool) in the receiver; In the examples in Figure 7-8, the correspondence of credits to frames are 1 to 1, where 1 credit can be seen as 1 available space for a frame.), and

increases the data credits available to the transmitter at the link transmitter in accordance with the data credits (Figures 7-8; col. 8, lines 14-28; note that the receiver transmits the available data credits to the transmitter, and afterwards the transmitters receive the credits to be allocated to each proper virtual lane. Thus, the credits available for allocation by the transmitter is increased).

First, even though Martin shows a forward link and a reverse link, as discussed above, Martin does not specifically show that the forward link and the reverse link are part of an ingress link.

Second, even though Martin shows additional data credits, as discussed above, Martin does not specifically show that the additional data credits are transmitted through a flow control packet wherein the flow control packet contains data credits.

However, the above-mentioned claim limitations are well-established in the art as evidenced by prior art of Martin.

Specifically, Martin shows an ingress link having a forward link and a reverse link (Figure 5; col. 5, lines 62-67; There is one inter-switch link (ISL) (ingress as viewed by receiving entity) between E-ports 44 and 46. The ISL is divided into eight (8) virtual channels, VC0, 1, 2, 3, 4, 5, 6 and 7. On the transmitter of E-port 44, they are represented as channels 110 through 117 and on the transmitter of E-port 46, they are similarly represented as channels 120 through 127.).

In view of the above, having the system of Martin, then given the well-established teaching of the admitted prior art of Martin, it would have been obvious to one of ordinary skill in the art as to modify the system of Martin as taught by the admitted prior art of Martin, in order to address the problem of conflict when multiple devices share a same physical ISL (col. 3, lines 1-30).

Still, modified Martin does not specifically show additional data credits are transmitted through a flow control packet wherein the flow control packet contains data credits.

However, the above-mentioned claim limitations are well-established in the art as evidenced by Bloch. Bloch shows a method of link-level flow control that includes establishing a plurality of logical links between a transmitting entity and a receiving entity in a network that

utilizes credit allocation wherein the transmission of data over a given logical link is responsive to the allocation of credits (abstract).

Specifically, Bloch shows additional data credits are transmitted through a flow control packet wherein the flow control packet contain data credits (Figure 2; credit packet 46; col. 1, lines 37-47; note that the receiver informs the transmitter of available additional credits through a flow control packet.).

In view of the above, having the system of Martin, then given the well-established teaching of Bloch, it would have been obvious to one of ordinary skill in the art to modify the system of Martin as taught by Bloch in order to enhance the efficiency of buffer memory use in switching devices in a packet switching fabric (col. 2, lines 2-3).

As to claim 2, modified Martin shows the link receiver updating the free buffer pool (Figures 7-8; note that the (buffer) pool is updated when the frames are received by the receiver 46 and/or when credits are transmitted by receiver 46; thus, denoting occupied or available buffer space.). Since modified Martin only shows specific examples of interaction between transmitter and receiver, modified Martin does not specifically show updating of free buffer pool as one of the plurality of packets is transmitted out of the plurality of receiver buffers.

However, the above-mentioned claim limitations are well-established in the art as evidenced by Bloch. Specifically, Bloch shows updating of free buffer pool as one of the plurality of packets is transmitted out of the plurality of receiver buffers (Figure 5 shows a flow chart that illustrates a method of re-allocation of credits in the receive queue 28 after a data packet has passed out of buffer 25; col. 8, lines 22-51 shows the different scenarios of re-

allocation of credits (or buffer spaces) when the packet was passed out of the buffer; col. 3, lines 28-53.).

In view of the above, having the system of Martin, then given the well-established teaching of Bloch, it would have been obvious to one of ordinary skill in the art to modify the system of Martin as taught by Bloch in order to enhance the efficiency of buffer memory use in switching devices in a packet switching fabric (col. 2, lines 2-3).

As to claim 3, modified Martin shows the flow control packet (Bloch: col. 1, lines 37-47; note that the receiver informs the transmitter of available additional credits through a flow control packet.) notifies the link transmitter of an empty portion of the plurality of receiver buffers (Martin: col. 1, line 60 to col. 2, line 20; note that the number of credits available refers to the available buffer space; Bloch: col. 2, lines 40-43).

As to claim 4, modified Martin shows one of the plurality of data credits corresponds to one of the plurality of receiver buffers being empty (Martin: col. 1, lines 41 to col. 2, line 20; note that one unit of buffer memory is represented by one credit).

As to claim 5, modified Martin selecting from the plurality of logical channels (Martin: Figure 7; note that virtual channel VC4 is in use; Figure 8; VC2 and VC4 are in use) to allocate the additional data credits at the link transmitter (Martin: col. 8, line 35 to col. 9, line 18; the transmitter controls the allocation of the credits to each VC. It is noted that when 1 frame carrying VC (i.e. VC4 as to Figure 7) is in use, the transmitter allocates (1,1,1,1, 1,1,1,1). Similar situation applies to Figure 8 example.).

As to claim 7, modified Martin shows the link transmitter and the link receiver operate in a switch fabric network (Martin: Figure 1; col. 4, lines 64-67 shows fabric 32 comprises one or more switches; Figures 2-8 shows that each switch contains a transmitter and a receiver).

As to claim 8, modified Martin shows an Infiniband network (Bloch: Figure 1; col. 4, lines 58-63; note Infiniband fabric).

As to claim 9, Martin shows a switch (Figure 1, 7-8; shows a switch), comprising:

a plurality of receiver buffers at a link receiver (col. 1, line 41 to col. 2, line 20; note the buffer memories associated with each port, where each port has a receiver and a transmitter; claim 14 of Martin shows a plurality of buffers) coupled to receive a packet from a link transmitter on a link (Figures 7-8; note receiver 46 receives frames (denoted as squares) from transmitter 44)

after the link transmitter allocates a plurality of data credits to a plurality of logical channels (Figure 7-8; col. 8, line 14 to col. 9, line 18; note the initial credit allocation by the transmitter (1, 1, 1, 1, 1, 1, 1, 1) for VC0-7),

a forward link (Figures 7-8; note the VC/link where frames (squares) are transmitted along is the forward link as viewed by transmitter 44) and a reverse link (Figures 7-8; note the VC/link where credits are transmitted along is the reverse link as viewed by transmitter 44)

wherein the packet is stored (col. 1, lines 41-59; note that the receiver receives incoming information (i.e. frames) which is stored temporarily in buffer memories) in the plurality of receiver buffers (claim 14 of Martin shows a plurality of buffers) when received by the link receiver (Figure 7-8; col. 5, lines 13-60; note frames received by receiver);

a free buffer pool at the link receiver (Figures 7-8; col. 1, line 60 to col. 2, line 20; a receiver on a port is allocated a fixed amount of buffer space to temporarily store received frames; the receivers advertise to the transmitter the amount of buffer space represented by the number of credits available; in this instance, it can be seen that amount of buffer space (free buffer pool) is present in the receiver side. Further note the usage of credits in relation to the pool in the process performed in Figures 7-8); and

a link receiver flow control algorithm (col. 5, lines 13-25, col. 10, lines 19-29; note control module for managing information flow (i.e. transmission of frames) and managing buffer space. It is noted that the present invention (i.e. process shown in Figure 7-8) is loaded into a control module; col. 8, line 23-24, shows the receiver advertises the total credits available for the port; col. 8, lines 60-62, shows the receiver starts to return credits when a frame transmitted from a transmitter reaches the receiver. It is noted that the transmission of credits are one way of regulating the buffer space in the receiver as shown in col. 1, line 60 to col. 2, line 20. In this instance, the two examples shown above are examples of flow control process (i.e. advertisement of credits, regulation of buffer space) performed by the receiver and since the control module is stated to manage buffer space, the control module can also be seen as performing receiver flow control method. Thus, the control module is seen as a link receiver flow control module/algorithm),

wherein the link receiver flow control algorithm transmits additional credits to the link transmitter on the reverse link (Figures 7B, 8B; shows transmission of additional credits on the VC/link (reverse VC/link as viewed by transmitter 44).) if the free buffer pool contains additional data credits (Figures 7-8; col. 1, line 60 to col. 2, line 20; col. 8, line 14 to col. 9, line

18; note that credits are transmitted since there are available/additional credits) and the reverse link is idle (Figures 7A-7B, 8A-8B; note that prior to situation shown in Figures 7B/8B, the VC/link (reverse link as viewed by transmitter 44) where the credits are transmitted is idle (i.e. no credits are currently being transmitted).), and

wherein the additional data credits represent ones of the receiver buffers at the link receiver that are available to receive new packets (col. 5, lines 13-25; note buffer spaces in central memory and the operation of the buffer-to-buffer credit, as shown in Figure 7-8, which represents the buffer space as described in col. 1, line 60 to col. 2, line 20. Also, it should be noted that the receiver is allocated a fixed amount of buffer space represented by a fixed number of buffer-to-buffer credits.); and

the link receiver flow control algorithm adapted to increase and decrease the free buffer pool in accordance with a number of the additional data credits that become available at the link receiver (col. 1, lines 60-62; note that the receiver is allocated a fixed amount of buffer space represented by a fixed number of buffer-to-buffer credits. Figure 7-8, col. 5, lines 13-60; also note that upon reception of the frames transmitted by the transmitter, the receiver starts to transmit credits to the transmitter where the credits represent available buffer space. It is noted that the transmission of credits advertises the available buffer space to be used by the transmitter and thus, it can be seen that the issuance/advertisement of credits, decreases the available buffer space (free buffer pool) in the receiver; In the examples in Figure 7-8, the correspondence of credits to frames are 1 to 1, where 1 credit can be seen as 1 available space for a frame. Col. 2, lines 11-20; note that once the frame is confirmed to have been retransmitted by a transmitter on the receiving switch, or used by the device, then the buffer space is free to be used to store a new

frame. Thus, in this instance, the control module is also adapted to increase the available buffer space, by retransmission/processing of received frame as indicated.), and

to increase the number of the data credits accordingly at the link transmitter (Figures 7-8; col. 8, lines 14-28; note that the receiver transmits the available data credits to the transmitter, and afterwards the transmitters receive the credits to be allocated to each proper virtual lane. Thus, the credits available for allocation by the transmitter is increased).

First, even though Martin shows a forward link and a reverse link, as discussed above, Martin does not specifically show that the forward link and the reverse link are part of an ingress link.

Second, even though Martin shows additional data credits, as discussed above, Martin does not specifically show that the additional data credits are transmitted through a flow control packet.

However, the above-mentioned claim limitations are well-established in the art as evidenced by prior art of Martin.

Specifically, Martin shows an ingress link having a forward link and a reverse link (Figure 5; col. 5, lines 62-67; There is one inter-switch link (ISL) (ingress as viewed by receiving entity) between E-ports 44 and 46. The ISL is divided into eight (8) virtual channels, VC0, 1, 2, 3, 4, 5, 6 and 7. On the transmitter of E-port 44, they are represented as channels 110 through 117 and on the transmitter of E-port 46, they are similarly represented as channels 120 through 127.).

In view of the above, having the system of Martin, then given the well-established teaching of the admitted prior art of Martin, it would have been obvious to one of ordinary skill

in the art as to modify the system of Martin as taught by the admitted prior art of Martin, in order to address the problem of conflict when multiple devices share a same physical ISL (col. 3, lines 1-30).

Still, modified Martin does not specifically show additional data credits are transmitted through a flow control packet.

However, the above-mentioned claim limitations are well-established in the art as evidenced by Bloch. Bloch shows a method of link-level flow control that includes establishing a plurality of logical links between a transmitting entity and a receiving entity in a network that utilizes credit allocation wherein the transmission of data over a given logical link is responsive to the allocation of credits (abstract).

Specifically, Bloch shows additional data credits are transmitted through a flow control packet (Figure 2; credit packet 46; col. 1, lines 37-47; note that the receiver informs the transmitter of available additional credits through a flow control packet.)

In view of the above, having the system of Martin, then given the well-established teaching of Bloch, it would have been obvious to one of ordinary skill in the art to modify the system of Martin as taught by Bloch in order to enhance the efficiency of buffer memory use in switching devices in a packet switching fabric (col. 2, lines 2-3).

As to claims 10, 11, and 12, these claims are rejected using the same reasoning presented in claims 3, 4, and 5, respectively.

As to claim 15 (Examiner interprets dependency of claim 15 to claim 9), modified Martin shows an Infiniband network (Bloch: Figure 1; col. 4, lines 58-63; note Infiniband fabric).

As to claim 16, Martin shows a method (abstract shows a method performed by the system in Figure 7-8) of using a computer-readable medium (col. 10, line 19-29; the present invention may be implemented in a software format, as a machine readable, machine executable program. The software program executing the present invention can be loaded into a processor or control module on a switch, or a buffer credit management module on a switch) to update a link transmitter, the method comprising:

providing from a link a receiver (Figure 7-8; receiver 46) a plurality of data credits to a link transmitter (Figures 7-8; note the plurality of credits (shown in figures as circles) sent from the receiver 46 to transmitter 44);

allocating at the link transmitter the plurality of data credits to a plurality of logical channels (Figure 7-8; col. 8, lines 35-48 the transmitter controls the allocation of the credits to each virtual channel (VC); further note the plurality of VCs (VC0-7).);

transmitting a plurality of packets (Figures 7-8, note that frames as shown as squares) from the link transmitter to the link receiver (Figures 7-8; note the transmission of frames (denoted by squares in figures) from transmitter 44 to receiver 46);

a forward link (Figures 7-8; note the VC/link where frames (squares) are transmitted along is the forward link as viewed by transmitter 44) and a reverse link (Figures 7-8; note the VC/link where credits are transmitted along is the reverse link as viewed by transmitter 44), and

wherein the plurality of packets are transmitted on the forward link (Figures 7-8; note the plurality of frames (multiple squares) are transmitted on the VC/link; further note that since the packets are transmitted from the transmitter 44 to receiver 46, the transmitter 44 views the VC/link where the frames are transmitted as a forward VC/link);

storing the plurality of packets in a plurality of receiver buffers at the link receiver (col. 1, lines 60 to col. 2, lines 10; note that a receiver on a port is allocated a fixed amount of buffer space to store received frames; each time a frame is received by the receiver, the frame is stored in a buffer space; col. 5, lines 13-25);

using a flow control algorithm (col. 5, lines 13-25, col. 10, lines 19-29; note control module for managing information flow (i.e. transmission of frames) and managing buffer space. It is noted that the present invention (i.e. process shown in Figure 7-8) is loaded into a control module; col. 8, line 23-24, shows the receiver advertises the total credits available for the port; col. 8, lines 60-62, shows the receiver starts to return credits when a frame transmitted from a transmitter reaches the receiver. It is noted that the transmission of credits are one way of regulating the buffer space in the receiver as shown in col. 1, line 60 to col. 2, line 20. In this instance, the two examples shown above are examples of flow control process (i.e. advertisement of credits, regulation of buffer space) performed by the receiver and since the control module is stated to manage buffer space, the control module can also be seen as performing receiver flow control method. Thus, the control module is seen as a link receiver flow control module/algorithm)

to increase a count of data credits in a free buffer pool at the link receiver (Figures 7-8; note that the (buffer) pool is updated when the frames are received by the receiver 46 (increased) and/or when credits are transmitted by receiver 46; col. 1, line 60 to col. 2, line 20; a receiver on a port is allocated a fixed amount of buffer space to temporarily store received frames; the receivers advertise to the transmitters the amount of buffer space represented by the number of credits available; in this instance, it can be seen that amount of buffer space (free buffer pool) is

present in the receiver side. Further note the usage of credits in relation to the pool in the process performed in Figures 7-8)

when one or more of the receiver buffers becomes free to receive a new packet (col. 1, lines 60-62; note that the receiver is allocated a fixed amount of buffer space represented by a fixed number of buffer-to-buffer credits. Col. 2, lines 11-20; note that once the frame is confirmed to have been retransmitted by a transmitter on the receiving switch, or used by the device, then the buffer space is free to be used to store a new frame. Thus, in this instance, the control module is also adapted to increase the available buffer space, by retransmission/processing of received frame as indicated.) and

using the flow control algorithm (col. 5, lines 13-25, col. 10, lines 19-29; note control module managing information flow (i.e. transmission of frames) and managing buffer space. In particular, receiver flow control is performed as shown in Figure 8 in relation to receiver advertising/returning credits) to transmit additional data credits from a link receiver to the link transmitter on the reverse link (Figures 7B, 8B; shows transmission of additional credits on the VC/link (reverse VC/link as viewed by transmitter 44) if the free buffer pool contains additional ones of the data credits (Figures 7-8; col. 1, line 60 to col. 2, line 20; col. 8, line 14 to col. 9, line 18; note that credits are transmitted since there are available/additional credits) and the reverse link is idle (Figures 7A-7B, 8A-8B; note that prior to situation shown in Figures 7B/8B, the VC/link (reverse link as viewed by transmitter 44) where the credits are transmitted is idle (i.e. no credits are currently being transmitted).); and

using the flow control algorithm (col. 5, lines 13-25, col. 10, lines 19-29; note control module managing information flow (i.e. transmission of frames) and managing buffer space. In

particular, receiver flow control is performed as shown in Figure 8 in relation to receiver advertising/returning credits)

to decrease the count of data credits in the free buffer pool of the link receiver (col. 1, lines 60-62; note that the receiver is allocated a fixed amount of buffer space represented by a fixed number of buffer-to-buffer credits. Figure 7-8, col. 5, lines 13-60; also note that upon reception of the frames transmitted by the transmitter, the receiver starts to transmit credits to the transmitter where the credits represent available buffer space. It is noted that the transmission of credits advertises the available buffer space to be used by the transmitter and thus, it can be seen that the issuance/advertisement of credits, decreases the available buffer space (free buffer pool) in the receiver; In the examples in Figure 7-8, the correspondence of credits to frames are 1 to 1, where 1 credit can be seen as 1 available space for a frame.),

while updating the number of the data credits available for use by the link transmitter (Figures 7-8; col. 8, lines 14-28; note that the receiver transmits the available data credits to the transmitter, and afterwards the transmitters receive the credits to be allocated to each proper virtual lane. Thus, the credits available for allocation by the transmitter is increased/updated).

First, even though Martin shows a forward link and a reverse link, as discussed above, Martin does not specifically show that the forward link and the reverse link are part of an ingress link.

Second, even though Martin shows additional data credits, as discussed above, Martin does not specifically show that the additional data credits are transmitted through a flow control packet.

However, the above-mentioned claim limitations are well-established in the art as evidenced by prior art of Martin.

Specifically, Martin shows an ingress link having a forward link and a reverse link (Figure 5; col. 5, lines 62-67; There is one inter-switch link (ISL) (ingress as viewed by receiving entity) between E-ports 44 and 46. The ISL is divided into eight (8) virtual channels, VC0, 1, 2, 3, 4, 5, 6 and 7. On the transmitter of E-port 44, they are represented as channels 110 through 117 and on the transmitter of E-port 46, they are similarly represented as channels 120 through 127.).

In view of the above, having the system of Martin, then given the well-established teaching of the admitted prior art of Martin, it would have been obvious to one of ordinary skill in the art as to modify the system of Martin as taught by the admitted prior art of Martin, in order to address the problem of conflict when multiple devices share a same physical ISL (col. 3, lines 1-30).

Still, modified Martin does not specifically show additional data credits are transmitted through a flow control packet wherein the flow control packet contains data credits.

However, the above-mentioned claim limitations are well-established in the art as evidenced by Bloch. Bloch shows a method of link-level flow control that includes establishing a plurality of logical links between a transmitting entity and a receiving entity in a network that utilizes credit allocation wherein the transmission of data over a given logical link is responsive to the allocation of credits (abstract).

Specifically, Bloch shows additional data credits are transmitted through a flow control packet wherein the flow control packet contains data credits (Figure 2; credit packet 46; col. 1,

lines 37-47; note that the receiver informs the transmitter of available additional credits through a flow control packet.).

In view of the above, having the system of Martin, then given the well-established teaching of Bloch, it would have been obvious to one of ordinary skill in the art to modify the system of Martin as taught by Bloch in order to enhance the efficiency of buffer memory use in switching devices in a packet switching fabric (col. 2, lines 2-3).

As to claims 17, 18, 19, 20, 22 and 23, these claims are rejected using the same reasoning presented in claims 2, 3, 4, 5, 7 and 8, respectively.

Conclusion

19. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to REDENTOR M. PASIA whose telephone number is (571)272-9745. The examiner can normally be reached on M-F 7:00am to 3:30pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Aung Moe can be reached on (571)272-7314. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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